Historic, archived document

Do not assume content reflects current scientific knowledge, policies, or practices.

aS21
.A85J6
Cop. 2

1981 Annual Report to the Secretary of Agriculture by the Joint Council on Food and Agricultural Sciences

Agricultural Science and Education Accomplishments and Priorities

U.S. DEPT. OF AGRICULTURE
NAT'L AGRIC. LIBRARY
RECEIVED
MAR 24 '82
PROCUREMENT SECTION

The Joint Council on Food and Agricultural Sciences was established under authorization of Section 1407 of Title XIV of the Food and Agriculture Act of 1977. The purpose of the Joint Council as set forth in the legislation is to foster and coordinate research, extension, and higher education in the food and agricultural sciences.

This report was prepared under the direction of the Joint Council 1981 Annual Report Committee:

R. J. Hildreth, Chairman
Managing Director, Farm Foundation
Oak Brook, Illinois

Mary Carter
Associate Administrator,
Agricultural Research Service
S&E, U.S. Dept. of Agriculture

Richard A. Skok
Dean, College of Forestry
University of Minnesota

Staff assistance provided by Gary R. Evans and Susan G. Schram, Joint Council staff.

For copies of this report, please write to--

Executive Secretary
Joint Council on Food and Agricultural Sciences
USDA, Room 351-A, Administration Building
14th & Independence Avenue, S.W.
Washington, D.C. 20250

Issued January 1982

JOINT COUNCIL ON FOOD AND AGRICULTURAL SCIENCES

Secretariat:
Rm. 351A, Admin. Bldg.
U.S. Department of Agriculture
Washington, D.C. 20250

December 31, 1981

Honorable John R. Block
Secretary of Agriculture
Washington, D.C. 20250

Dear Mr. Secretary:

We are pleased to submit the 1981 annual report of the Joint Council on Food and Agricultural Sciences for your review.

The Joint Council is required by Section 1407, Public Law 95-113, to submit to the Secretary of Agriculture a summary of U.S. agricultural research, extension, and teaching achievements made during the year and to make suggestions for programs to be implemented the following year.

The enclosed report summarizes 1981 accomplishments in selected areas, and it suggests near-term priorities for research, extension, and teaching programs. The report also reviews progress made by the Joint Council in improving planning and coordination in the areas of water, agricultural productivity, and energy--its three top priority issues for 1981.

In the coming year, we will continue to serve as your major advisory link to the agricultural science and education community, to provide a forum for exchange of information on important issues in the food and agricultural sciences, and to improve planning and coordination among performers of agricultural research, extension, and higher education.

We appreciate this opportunity to brief you on Council activities.

Sincerely,

ANSON R. BERTRAND
Cochairman

JAMES H. ANDERSON
Cochairman

Enclosure

The Joint Council fosters coordination and planning in public and private research, extension, and teaching in the food and agricultural sciences.

Contents

The Joint Council on Food and Agricultural Sciences was established under authorization of Section 1407 of Title XIV of the Food and Agriculture Act of 1977. The purpose of the Joint Council, as set forth in the legislation, is to foster and coordinate research, extension, and higher education in the food and agricultural sciences. This report reviews the Council's 1981 accomplishments, as well as selected accomplishments of the United States food and agricultural science and education system.

In 1981, the Joint Council appointed an agenda committee to identify high priority areas for improved planning and coordination. The Council chose water, agricultural productivity, and energy as its top three issues for 1981 and four additional areas that are important for science and education in the coming years: Technology transfer; human resources; budgets for research, extension, and teaching; and postharvest technology, marketing, and export.

During 1981, the Council gave considerable attention to its structure for planning and coordination and how it could most effectively function in a climate of diversity, decentralized decisionmaking, and numerous existing planning activities. Its regional councils and national committees became fully functional and brought regional as well as national issues in teaching, research, and extension to the Joint Council for consideration.

The Joint Council also worked to strengthen its communications with the Secretary of Agriculture and his staff. In July, the Council responded to a series of questions raised by the Secretary. This was followed by a meeting with his top staff to discuss mutual concerns.

This report also summarizes 1981 accomplishments of the U.S. food and agricultural science and education system. It cites significant accomplishments and near-term priorities in the following areas of the system where the Joint Council has been involved in a coordinating role or has established a priority: Water; energy; range resources; agricultural productivity; integrated reproduction management; integrated pest management; food protection, distribution, and exports; national information programs; and food and agricultural expertise development.

Preface: The U.S. Food and Agricultural Science and Education System

U.S. agriculture, a cornerstone of the national economy, is unmatched anywhere in the world in efficiency or production capacity. Although many factors contribute to its unparalleled achievement, it is generally recognized that a major reason for agriculture's tremendous success is its technological base. Agricultural technology has supported growth rates of about 1.5 percent per year for the last three to four decades. These advances in technology are based on scientific knowledge achieved through the food and agricultural sciences system. This diverse and complex set of public and private institutions (fig. 1) has produced a continuous flow of technologies, such as chemical fertilizers, insecticides, hybrid corn varieties, improved breeds of livestock, and farm mechanization. The recognition that knowledge is a renewable resource with no absolute limit to growth has contributed to the dynamic changes in the set of institutions and organizations--State, Federal, and private--that have evolved to meet science and education needs in agriculture.

Knowledge and technology are functional only when appropriately transferred to farmers, ranchers, and other users. It is through the teaching and extension capacities of State, Federal, and private institutions that new knowledge and new technology are transferred to those who will apply it to produce food, fiber, forest, and range products.

As a consequence, a diverse, independent, yet mutually supportive food and agricultural system has developed and encompasses--

* Instructional programs to train scientists, farmers, and agribusiness personnel.

* Research and development to develop new and improved technology, production and marketing processes, and management procedures.

* An infrastructure for transferring technology and disseminating information to consumers, marketers, and agribusiness entrepreneurs.

* Information systems that link farmers, ranchers, and forest producers to sources of new knowledge.

* Feedback mechanisms allowing for users of food and agriculture science and education programs to have a voice in the design and shape of future programs.

Food and Agricultural Sciences System

Perhaps the greatest strengths of this system are the decentralized authority, independent decisionmaking processes, and the existence of formal and informal linkages that permit planning and coordination in a voluntary, nonauthoritarian manner.

States, Federal agencies, and private sector entities operate differently to serve their clientele. Strong networks of communication, however, enable research scientists of specific disciplines to keep abreast of the work of their peers. These same networks provide information for administrators and managers to make informed decisions.

Figure 1--The United States Food and Agricultural Science System

COOPERATIVE STATE INSTITUTIONS:

- Land-grant colleges or universities in each State as authorized by Act of 1862, plus 16 colleges of 1890 & Tuskegee Institute with programs of higher education in food & agricultural sciencea.

- Fifty-six State agricultural experiment stations (many with networks of aubstations) plus 16 schools of forestry, plua certain schools of home economics & vet. medicine with research programs partially supported by Federal formula funds. Research spending (all sources) estimated at over three-quarters of a billion dollars in FY 1980 involving approximately 7,300 science years of research effort.

- Cooperative Extension Services in all 50 States plus D.C. and U.S. territories. With total funding at approximately $745 million last year, Cooperative Extension programs involved over 17,000 professional staff years plus nearly 4,800 paraprofessional staff years, plus significant involvement by volunteers.

OTHER COLLEGES AND UNIVERSITIES:

- Approximately 50 non-land-grant, State-supported colleges or universities with programs of higher education, research, & outreach in food and agricultural sciences.

- Other public & private institutions of higher learning ranging from major multi-disciplinary universitiea to specialized vocational centers or institutes.

USDA RESEARCH/EDUCATION AGENCIES:

- The Agricultural Research Service with funding of $430 million in FY 1981 involving 2,800 science years of research at 148 locations in the U.S. and abroad.

- The Cooperative State Research Service with funding of $201 million in FY 1981 mainly channeled to the Cooperative State research system on formula basis; also includes competitive and special research grants and Federal administration.

- The Extension Service with funding of $292 million in FY 1981, mainly channeled to the Cooperative Extension system; also includes Federal administration.

- The National Agricultural Library funded at $8 million in 1981 for wide-ranging library & technical information services.

- The Office of Higher Education with funding of $11.5 mil. in FY 1981 channeled to land-grant system under Bankhead-Jones authority.

- The Economic Research Service with funding of $40 mil. for FY 1981, for about 440 SY's of economic & social science research & analysis.

- The Forest Service (Research Divisions) with funding of $122 million in FY 1981 provided nearly 1,000 SY's of research in resource management & utilization plus resource protection functions.

- Other USDA agencies with limited but direct R&E roles:
  - Office of International Cooperation and Development
  - The Soil Conservation Service
  - The Agricultural Marketing Service
  - Office of Transportation
  - The Agricultural Cooperative Service
  - The Statistical Reporting Service

OTHER FEDERAL AGENCIES:

- At least 14 Federal Departments, Commissions, & independent agencies besides USDA either conduct research & education programs closely related to agricultural & forestry or provide funds to support programs in the USDA-State system. Total funding for such programs in FY 1981 estimated at app. $700 million.

PRIVATE FIRMS:

- R&D performed by equipment, seed, fertilizer, & other input suppliers: producing, processing, & distributing operations; & specialized private R&D firms. No hard data on total funding or specific personnel. (Unpublished data from NSF estimates industry R&D related to farming, post-farming, & forestry at nearly $1.8 billion in 1979, about 1 1/2 times as large as the USDA-State research system funding.)

- Technical information dissemination similar to some functions of Extension performed by field personnel or buyers of farm commodities, dealers of farm inputs, trade journals or publications including the farm press & specialized technical information or consulting firms.

OTHER PRIVATE ORGANIZATIONS:

- Foundations or similar organizations which facilitate or channel funds to research and/or education programs in the public sector.

- Associations formed by private firms to conduct research and/or educational programs for their members.

Another hallmark of this system has been the high priority given to solving problems in the system. This requires a far-flung network capable of providing outreach programs to nearly every local community and of receiving information, ideas, and reactions from individuals. The land-grant university system can provide the resources to help the local communities identify and solve problems related to agricultural production, farm youth, homemaking, and rural and community development.

The linkage from the community to the university campus has been formalized through the State cooperative extension services, which are also linked with USDA's Extension Service and USDA's research and development agencies, such as Agricultural Research Service, Cooperative State Research Service, and Economic Research Service.

Financial support for this complex decentralized system comes from a variety of sources: State, Federal, local, private, and nonprofit organizations. The major funding comes from State and Federal appropriations. These funds are channeled through entitlements, formula distributions, direct and competitive grants, and line-item budgets to Federal laboratories, land-grant universities, and other institutions in the State/Federal partnership.

This partnership has its legislative roots in the Land-Grant Act of 1862 (the first Morrill Act), which granted Federal land to every State that agreed to establish at least one college to teach agriculture and the "mechanical arts" as well as other scientific and classical subjects. The second Morrill Act of 1890 added the historically black public colleges and institutions in 16 Southern States to the land-grant system. The Hatch Act created the State agricultural experiment stations in 1887, and later, in 1914, the Extension Service was established to provide instructions and demonstrations in home economics and related subjects to those not affiliated with land-grant institutions. These landmark pieces of legislation created the unique partnership between the U.S. Department of Agriculture, individual State and county governments, and land-grant colleges and experiment stations.

The Food and Agriculture Act of 1977 broadened the participation in food and agricultural science and education beyond USDA and the land-grant colleges. It explicitly recognized the need to better coordinate work within this system among Federal agencies, between the USDA and States, and with the private sector. It created the Joint Council on Food and Agricultural Sciences to foster planning and coordination, building on the linkages already in existence. It also authorized non-land-grant universities to participate in the partnership.

The Joint Council on Food and Agricultural Sciences

The Joint Council is composed of representatives of the major components of the science and education system. It provides the only forum in which these representatives can come together in one place to plan, coordinate, and discuss issues of concern to the system as a whole. The inherent strengths of the decentralized system are enhanced by the interactions among the various stakeholders. Therefore, the major role for the Joint Council is to improve linkages among all components of the system. For without effective linkages, the system cannot continue to serve the food and agricultural sector as it has in the past.

The membership of the Joint Council includes representatives from the following major performers in the U.S. food and agricultural science and education system:

* Land-grant colleges and universities.

* Non-land-grant colleges and universities.

* Foundations.

* Private industry.

* U.S. Department of Agriculture's--

  Agricultural Research Service.

  Cooperative State Research Service.

  Economic Research Service.

  Extension Service.

  Forest Service.

  National Agricultural Library.

* National Agricultural Research and Extension Users Advisory Board members who are nominated to serve on the Council.

Through improved planning and coordination, major performers of agricultural research, extension, and higher education should be able to--

* Increase benefits to society from food and agricultural science and education.

* Make more effective use of public and private resources devoted to food and agricultural science and education.

* Acquire knowledge of the social, economic, and environmental effects of science and education programs and use this knowledge in setting program priorities.

* Strengthen the responsiveness of the system to the needs of the users of food and agricultural science and education.

* Develop stronger public understanding of and support for food and agricultural science and education.

1981 Annual Report to the Secretary of Agriculture by the Joint Council on Food and Agricultural Sciences

Agricultural Science and Education Accomplishments and Priorities

The 1981 accomplishments of the U.S. food and agriculture science and education system are many and diverse. To document all of them is beyond the scope of this report.

The aim is to highlight and summarize accomplishments in selected areas of the system where the Joint Council has been involved in a coordinating role or has established a priority, to document progress in improving the planning and coordinating processes in the food and agricultural science system, and to recommend priorities for the forthcoming year.

In its role of fostering coordination among components of the food and agricultural science and education system, the Joint Council has developed and adopted an overarching hierarchical program structure as a means of aggregating the programs of research, extension, and teaching (see section entitled "1981 Accomplishments of the Joint Council"). This allows linkages to be established among the various programs. This hierarchical structure, called the common program structure, will facilitate the grouping of various programs of the food and agricultural science and education system into related program categories. The 1981 activities in the food and agricultural system that have been of specific interest to the Joint Council are also related to the program priorities that were listed in the report entitled "Proposed Initiatives for the Food and Agricultural Sciences, 1981-86."

The common program structure is organized around the following six categories:

* Natural Resources
* Production and Protection
* Processing, Marketing, and Distribution
* People and Communities
* Agricultural Policy
* General Administration and Program Support

The following reports illustrate progress in thrust areas drawn from these categories. These reports help to show the development of new knowledge and technology to meet increasingly critical needs of today, as population growth, expectations, and higher standards of living strain the limits of present resources.

Many of these programs can be expected to yield rich, future dividends, based on the past record of accomplishments and the present capabilities of the system. The needs and opportunities for expanding these and other programs are practically limitless, given sufficient resources.

If the more complex issues and problems of the future are to be addressed, the science and education system will need to use newer and more costly technologies. This represents a major challenge as we adapt to a climate of curtailed Federal spending as a means of lowering the rate of inflation. And this means that priorities for using and stretching the limited resources need to be identified and established to obtain the most efficient use of these funds. The Council's view is that the highest priority should be given to maintaining strong base programs of research, extension, and higher education across the wide range of organizations and scientific disciplines comprising the food and agriculture science system.

NATURAL RESOURCES

Range Resources

Background--Forage is used by animals to produce 26 percent by weight, of all human food, such as red meat, milk, and cheese, consumed in the United States. The demand for range and pasture forage is increasing. For example, cattle producers are responding to consumer desires for leaner meat by reducing the amount of time cattle spend on feed. In addition, feed grain production in the future will probably become smaller in volume but more expensive in price than today's crops because of declining petroleum supplies and increasing petroleum costs.

Livestock grazing of range and pasture requires few petroleum resources and enables production of food from land unsuitable or marginally suitable for cultivation or mechanical harvesting. As a result, future use of non-Federal rangeland for red meat production will likely increase. This is compounded by multiple-use demands now being placed on Federal lands which have been used primarily for grazing domestic and wild animals. Together, these factors support the need for increased knowledge through research and extension programs.

Range research and extension programs involve USDA's Forest Service, Agricultural Research Service, Cooperative State Research Service, Economic Research Service, and Extension Service. These research and extension programs provide the necessary information for other principal Federal agencies--Bureau of Land Management, Bureau of Indian Affairs, Fish and Wildlife Service, and Soil Conservation Service--to assist in the proper management of these lands. In addition, State land departments, agricultural commissions, State cooperative extension services, universities, and fish and game departments, as well as private sector rangeland owners, including livestock producers, railroads, utility companies, and plant-breeding and seed-producing companies, all have a stake in this renewable natural resource. Range research is currently conducted in 34 States but concentrated (92 percent) in 14 States. However, only 19 States are providing educational programs in range under the leadership of Extension range specialists. Despite inadequate research and education efforts for the users and managers of over 600 million acres of Federal and other rangeland, some significant accomplishments are being achieved.

Research to classify range and pasture plants and to increase basic understanding of their management and role in livestock production is continuing.

Accomplishments--Work is just beginning on the application of new technology for rapidly measuring water use and photosynthesis to range and pasture plant improvement and management. Prescribed burning, as a management tool, is working very well in some areas to remove brush and other competing vegetation. New herbicides allow control of brush and undesirable plants with resulting increases in production of more desirable range plants, while protecting the soil and water resource base.

Traditional concepts of the range ecosystem are now being challenged. The hypothesis has been proposed that not all plant communities proceed through a predictable series of changes, terminating in the natural potential vegetation for the area. Another hypothesis states that exclusion of large herbivores will not result in changes of plant composition in all plant communities. These concepts may be extremely important to range management. Creativity and initiative in range research is reassuring, despite inadequate support.

Genetic improvement of native range plants has increased forage production substantially. Significant progress has also been made in selecting range grasses for improved ease of establishment. Basic research, conducted within the wheatgrass tribe, resulted in the development of new grass species. One of these new interspecific hybrids has an increased potential for both production and drought tolerance.

Identification for natural genetic variations with shrub species and selecting varieties for specific traits shows promise for improving productivity and management of arid rangelands. One variety of sagebrush, for example, might be selected for its nutritional value; another variety, for its potential to rapidly stabilize disturbed areas.

To make current research findings on range more accessible to resource managers, an innovative process for searching and compiling literature was developed. A computer-based bibliographic file on range and related literature was compiled and the author index, keyword index, and camera-ready copy of the range research findings were derived from the computer file.

Fundamental knowledge of soil properties has led to the development of models that predict results of management of nutrients, soil and water from range watersheds, and improved techniques for establishing plants on disturbed lands. Similarly, fundamental knowledge of plants, water, and animals is providing the basis for a comprehensive range model that is now being developed.

On the educational front, three States within the last few years have developed range task forces of four to six extension specialists and two other States have added at least one extension range specialist. Results from some of the range programs for 1980 from nine different States indicate that over 40 workshops, short courses, and similar educational events were conducted for over 2,800 people. These included two State programs involving prescribed range burning, several Federal rangeland policy workshops, one drought relief program, and several range short courses on rangeland management.

Near-term priorities--In the short run, research goals should be to--

* Develop cost-effective methods to improve the condition and productivity of rangeland soil and vegetation.

* Determine the interrelationship between range, timber, wildlife, water, and other resources at selected strategy levels, and evaluate the effect of resource output on social well-being and rural economic development.

* Expand fundamental knowledge of physiology and ecology of range plants to provide a basis for dynamic management decisions and for incorporation in range management models, to aid ranchers, and to identify additional research needs.

* Identify, select, and develop improved range legume species.

* Develop superior range species for ease of establishment, water use, efficiency, digestibility, and production.

Water resources

Background--The demand for agricultural products is expected to increase by 60 to 85 percent during the next 20 years. Population growth and industrial development also will increasingly compete for both surface and ground water supplies, perhaps at even greater rates of growth. As a consequence, agriculture is faced with the prospect of diminishing supplies of irrigation water.

Irrigated acreage has increased by 2.5 fold during the past three decades--from about 20 million acres in 1944 to 50.8 million acres in 1978. About 87 percent of the irrigated land is harvested cropland. Related to the total 1978 harvested cropland base of 321 million acres, approximately 14 percent is irrigated, but those irrigated harvested croplands produce 26 percent of the total annual value of U.S. crop production. To accomplish this, however, irrigated agriculture consumes over 80 percent of the water withdrawn in the United States. Of the irrigation water consumed, approximately 40 percent is drawn from ground water aquifers. In many areas of the country, withdrawal of ground water greatly exceed aquifer recharge, thus depleting ground water supplies.

Several concerns related to water resources have been identified in recent reports. For example, in its 1981 report to the President and the Congress, the National Agricultural Research and Extension Users Advisory Board emphasized the critical importance of water resources to food and agricultural production. In the July 1980 report to the Joint Council, the Joint Council's Interim National Research Planning Committee noted that research programs on water and watersheds had decreased by 56.4 scientist years in the last decade. In addition, reports developed in response to the Soil and Water Resources Conservation Act of 1977 pinpointed four critical areas in our Nation's water supplies and presented objectives for their conservation: (1) Increase farm irrigation efficiency, (2) reduce ground water depletion by better scheduling of limited irrigation water and by conversion to dryland agriculture, (3) improve off-farm water conveyance efficiency, and (4) improve water use efficiency for nonirrigated crop production.

Accomplishments--Major research, teaching, and extension efforts related to water have been undertaken. Intensive educational programs have been conducted on computer-assisted water management to improve water use efficiency and save energy and on use of the minimum tillage, no-till, and residue management systems to reduce soil erosion and crop production. Landowners were presented alternatives, wherever possible, and assisted in assessing management as well as economic effects as they develop appropriate solutions for their water management problems.

Improvements in water-harvesting technology have assisted ranchers in providing needed livestock drinking water in several of the Western States. Progress in chemical treatments that induce runoff has increased the feasibility of developing watersheds to concentrate available water on a fraction of an arid or semiarid area to increase forage production. In addition, watershed management studies have shown that brush control on rangeland can increase both forage production and annual water yield.

Computer-assisted irrigation scheduling on 1.6 million acres in Nebraska in 1980 saved an estimated $36 million in direct energy costs because less irrigation water was supplied. It also saved $12 million by reducing the leaching of fertilizer. A limited irrigation/dryland-farming system, designed for the southern Great Plains, has also been shown to be highly effective. This farming system combines the best features of both dryland and irrigated systems to make maximum use of both preciptation and limited irrigation water. Preliminary results with this system show that grain sorghum production per unit of irrigation water was double that obtained with conventional surface irrigation.

The Extension Service has published and widely distributed a water conservation checklist for householders, giving them water conservation tips to use in and around the home. Throughout the past year, the Extension Service also has been involved in a wide range of educational programs. For example, several State cooperative extension services, in cooperation with other agencies and organizations, have conducted irrigation management training conferences and workshops for irrigators, irrigation consultants, and irrigation suppliers to teach the use of the AGNET computer network. Extension demonstrations and educational meetings have also been instrumental in the rapid adoption of conservation tillage techniques. It was recently estimated that approximately 70 million acres of crops are now produced with the help of these water-conserving, fuel-saving, and erosion-reducing methods.

Near-term priorities--Research efforts are needed in several areas for the identification and development of future agricultural water supplies and in water use efficiency. Studies are needed to--

* Improve technology in the use and re-use of low-quality water in agriculture.

* Analyze the effect of increased competition for water in agriculture.

*Increase water supplies through snow and watershed management.

* Develop improved systems for use of surface and ground water storage.

* Develop systems for more efficient infiltration, storage, conservation, and use of limited water supplies in both irrigated and nonirrigated agriculture.

* Develop technology for conversion from irrigated agriculture to dryland agriculture when water supplies become more limited.

* Develop supplemental irrigation and control drainage systems for humid areas.

* Identify appropriate limits so that weather probabilities can be used for agricultural management decisions.

Sufficient data must be gathered for application of water management techniques to control movement of salts. Data acquisition and analysis are needed in studying the characteristics of rainfall, characteristics of the root zone, and water-extraction patterns and water transmission through subsoil.

Extension educational programs are needed to educate farmers concerning diminishing water supplies and efficient water management for both irrigated and nonirrigated systems in arid, semiarid, and humid regions and also to educate the public concerning the food production system and the relationship between water supply and food supply.

Energy

Background--The energy situation has strained relationships between nations and lowered the standard of living for many people throughout the world. There is a need to use energy more efficiently, reduce waste, and produce alternative fuels from renewable resources on farms and forest lands.

Agriculture is producing commodities, not only for domestic and foreign food but for conversion to fuels. Agricultural energy production problems will require greatly expanded research and education programs.

An assured supply of energy for the U.S. food and agriculture system is clearly a national need. Growing energy costs and the possibility of sporadic shortages dictate much greater emphasis on agricultural energy in research and education programs.

National energy objectives have been articulated in many laws and policy statements. As they relate to agriculture, these policy statements can be summarized as follows: The reduction of dependence on foreign oil and minimization of the effects of supply disruptions through prudent conservation measures; implementation of programs and policies that encourage domestic energy production and its efficient use, without serious inflationary effects; development of inexhaustible energy sources for sustained economic growth through the next century; and use of all energy sources in ways that do not endanger or degrade the environment and health and safety of our citizens. The 1981 report, "Energy Capabilities and Opportunities," cites these goals of USDA's science and education (S&E) energy program: "...to help meet the overall energy needs of the U.S. food and agriculture system and the needs of rural America by developing knowledge and techniques."

Accomplishments--Accomplishments throughout the research and education system have taken place within several energy areas. Much effort has been directed toward setting up two agricultural energy research centers. The Southern Agricultural Energy Center at Tifton, Georgia, is developing research programs in on-farm energy systems; the Northern Agricultural Energy Center at Peoria, Illinois, is developing research programs for the production and conversion of biomass as an energy source.

In-house and competitive research programs have studied agricultural applications of solar energy. Processes for solar crop drying, food processing, and building heating have been developed.

Wind system research for irrigation, environmental control, and other applications are now being managed through the energy research program at Bushland, Texas. Research on the production, harvest, collection, and conversion of energy crops for development of biomass is managed by the regional agricultural energy centers. Several university grants, initiated in 1979, are now developing into small scale on-farm alcohol systems to determine the most efficient and effective method of developing alcohol at the farm level for use as an alternate energy source.

Extension Service programs have been active in solar heating demonstrations. Nine States participated in extension programs on the use of solar heating in livestock production and on alternative source energy production. The other area of major emphasis from extension has been in helping families to develop methods of conserving energy at home and in the community. These efforts include home weatherization, space utilization, home management with reduced energy use, clothing, home furnishings, food preparation and preservation, youth programs in energy conservation, and community action for energy management.

Near-term priorities--An assured supply of energy for the U.S. food and agricultural system is clearly in the public interest and, as a national priority, has been supported as an area needing increased emphasis in the Joint Council's 1980 report. For teaching programs, the following priorities are identified:

* Provide adequate personnel at various educational levels to meet energy program needs for university teaching, research, and extension.

* Work with community colleges and vocational/technical schools to provide the technicians needed to apply energy conservation and management practices and adapt alternative energy situations to farm operations, agricultural processes, rural households, and farm buildings.

Research priorities include the following:

* Establish a comprehensive data base on energy use in all aspects of the entire food system and in rural communities.

* Develop or adapt the technology for various renewable energy applications on farms, in rural households, and in communities.

* Investigate new crop and livestock systems that are more energy efficient than those presently used, including integrated systems that bring together a number of conservation and substitution technologies.

* Investigate new crops, both annuals and perennials, that increase biomass yields or reduce energy requirements.

* Develop more energy efficient production, processing, transportation, and storage systems.

Extension priorities are as follows:

* Develop a comprehensive energy outreach program that will include resource conservation, renewable alternatives, and energy management as related to the food and agricultural system.

* Designate the transfer of energy technology to users and the efficient management of energy as priority programs within the Extension Service.

PRODUCTION AND PROTECTION

Agricultural Productivity

Background--To help provide for projected demand for ample food, fiber, and wood products for domestic needs and export markets at reasonable prices will require the U.S. agricultural system to produce plant and animal products more efficiently. The agricultural science and education system contributes to improved agricultural productivity and product quality by using improvements in biological and genetic resources in the management of microenvironments and in the management of plant and animal pests that reduce overall production efficiency.

The development of new varieties through conventional plant breeding has increased productivity greatly in the past. However, the future emphasis should not rest solely on plant breeding. Other areas of research should include cropping methods, new equipment, equipment utilization, as well as improved fertilizer use of growth regulators, and so forth.

Animal productivity research has concentrated on increased birth rates, improved disease resistance, and more efficient utilization of foods. Advances in animal breeding and genetics--such as improved genetic evaluation of breeding stock, embryo transfer, improved estrus detection and conception rates in cows, and synchronized farrowing in hogs--will help boost meat, milk, and egg production.

In other areas, particularly in disease prevention and control, exciting research breakthroughs may soon produce tremendous benefits. Selection for genetic resistance to disease is already being practiced and is expected to eliminate the need for many drugs and vaccines.

Accomplishments--There is some room for encouragement as the United States makes advances in bridging the gap in agricultural technology. Because agricultural productivity accomplishments are of such a long-term nature, agricultural science and education accomplishments will not be reflected in any one year's productivity gains. The large harvest in 1981, for example, was primarily the result of favorable weather conditions rather than a result of a few advances in productivity research. Furthermore, science and education accomplishments do not show up until they have become widely adopted by farmers and ranchers.

The biotechnical revolution is rapidly bringing about significant improvements in the capablity to increase agricultural productivity:

* One recent accomplishment in the area of recombinant DNA (deoxyribonucleic acid) technology, has been the ability to analyze proteins within starch particles from corn kernels. This will be manifested through potential improvements in food quality and the likely increase of physiological efficiency of crop plants.

* Federal and State scientists have developed a technology for moving genes from one kind of plant to another. In this breakthrough genetic engineering feat, the scientists transferred a gene for storage protein from its native location in a French bean seed into a sunflower cell, thus expanding the potential for farmers to raise more efficient food-producing plants in the future.

* Research in corn breeding has resulted in the development of a sophisticated system of isoenzyme techniques which allow "fingerprinting" to characterize inbred corn lines or to characterize genetic lines to establish uniqueness. The system will be able to serve the corn industry as a means of quality control in identification of seedlots and in cases involving plant protection rights.

* A bioregulator for plants has been developed to increase cold tolerance in cotton seedlings. Treatment with the bioregulator will simplify the protection of young plants from freezing temperatures, thus allowing cotton to be planted farther north than the traditional cotton zone.

* The first in a series of clonal repositories for fruit and nut crops opened in 1981. Genetic material maintained in these repositories will help researchers develop a wider base of crops that will be able to withstand diseases, pests, and drought. The clonal germplasm repository system will, when completed, consist of 12 facilities. Germplasm will be made available to researchers and plant breeders of USDA, State agricultural experiment stations, and industry throughout this country and, to the extent possible, to researchers and plant breeders in other countries.

* Specific accomplishments in crop breeding have resulted in approximately 75 percent of last year's U.S. soybean acreage being planted to multiple pest-resistant, high-yielding varieties developed within the State-Federal research and education system. This past year has also seen the release of a large number of wheat, oat, barley, and rice varieties to growers for development into large acreage plantings. Russett potato, a new high-quality, disease-resistant baking and processing potato, was developed in Idaho. This potato out-yields the traditional Russett Burbank potato by more than 30 percent and has 22 percent more vitamin C. Also significant are the citrus hybrids with cold-hearty relatives from Australia that survived a Florida freeze at 10°F (-12°C). Many of these hybrids were developed from State-Federal breeding programs. At Prosser, Washington, six multiple disease-resistant dry bean cultivars were jointly released by State agricultural experiment stations in the Pacific Northwest, Colorado, and North Dakota, all of which participated in the selection and testing of the beans.

* Animal scientists have perfected techniques and hormone controls to cause superovulation in cows, fertilize eggs in the laboratory, bring on estrus in brood cows, and implant fertilized eggs or embryos in the brood cows. With these techniques, breeders could match eggs from superior cows with semen from superior bulls. Beef producers could double calf production by implanting two embryos in each brood cow. Dairy farmers could schedule lactation periods of their cows.

* Herefords have been developed into sound Hereford cattle with good conformation and meat quality and a fast growth rate. Weaning weight and yearling weight are increasing by 22 and 35 pounds, respectively, per generation. This is the most rapid and consistent gain in average weaning and yearling weight of any of the Hereford varieties.

* Sheep fertility increased significantly under artificial light. Suffolk rams and ewes, bred in a simulated mating season, had a lambing rate of 67 percent, compared with 32 percent for ewes mated to rams in regular light outdoors. Artificial light also stimulated the growth rate. When reared under 16 hours of artificial light each day in the spring, rams and neutered lambs grew faster and more efficiently than those grown under 8 hours of natural light.

Near-term priorities--Technological advances in agricultural productivity have provided the foundation for development of new crop production methodologies. However, these methodologies must be developed further:

* Increased emphasis must be placed on the use of bioregulators to enhance high-quality crop production over a broad spectrum of environmental conditions. Further, work is needed to increase cold tolerance and drought tolerance, speed ripening for harvest, and improve efficiency of nutrient use.

* More work is needed to increase photosynthetic efficiency using traditional plant breeding techniques and genetic engineering. Emphasis must be placed on learning how to eliminate photorespiration in major crops.

* Support must be continued for work to increase nitrogen fixation in legumes by finding nitrifying bacteria that are more efficient in making nitrogen available to the plants. Priorities must also be placed on seeking nitrogen-fixing capabilities in nonleguminous plants to reduce dependency on highly priced nitrogen fertilizers.

* Scientists must continue to look for ways to reduce water intake in plants. Basic studies of soil-plant-water relationships must proceed to learn how plants regulate the use of water. This will provide improvement in developing plants that can survive droughts or irrigation water shortages.

Technology transfer (the diffusion of scientific advancements to farmers and other users) will require--

* Greater private-Federal interaction to encourage industry to meet producers' needs with new, better quality equipment, management systems, information services, and marketing techniques.

* Incorporation of the latest developments and ideas into teaching curriculums.

* A Federal priority to support extension as a primary technology transfer mechanism for agricultural research information.

* Financial support commensurate with increasingly complex systems and equipment necessary for effective technology transfer.

Integrated Reproduction Management

Background--One of the major ways for livestock producers to obtain relief from the cost/price squeeze in inflationary times is to increase the supply of animal products from the base herd. This is accomplished primarily by reproductive efficiency. Improved technologies in production efficiency are vital for beef, dairy, swine, sheep, and poultry industries.

A fundamental element of efforts to help improve production efficiencies is effective communication about producer problems and research information--from the basic research to the field application state. Federal agencies, including Agricultural Research Service, Cooperative State Research Service, Extension Service, and the National Agricultural Library, are cooperating in State, regional, and national projects. In addition, the private sector is well represented at both national and State levels by producer-commodity associations and user groups who are identifying problems and communicating research findings and extension recommendations to the producer.

Accomplishments--The National Integrated Reproduction Management Program (IRM) is in the developmental stage. It is supported by approximately $26 million from Federal funds and considerably more from State sources. Although some IRM-type activities have been developed within the States, Federal funding of specific projects began in 1981 through the cooperative extension services. A consortium of the University of Florida, Pennsylvania State University, and the University of Vermont is conducting a pilot project to improve reproductive efficiency in dairy and beef cattle. Emphasis is placed on reducing the open days in dairy cows and improving breeding soundness evaluation in bulls.

In addition to this early effort, other reproductive efficiency work is now underway and beginning to show results. The polypay sheep, a synthetic breed developed at the ARS laboratory at Dubois, Idaho, by scientists in a State-Federal partnership, can produce more than two lambs a ewe per year and a weaned lamb crop exceeding 150 percent in most years. This exceeds the national average by 53 percent. Poultry is a highly integrated industry, from both the business and scientific perspectives. The annual rate of lay increased from 218 eggs in 1970 to 240 in 1979. In addition to this, death loss has been reduced approximately 3 percent in the same decade, primarily because of the control of Marek's Disease. Advances in technology for semen storage and handling have greatly enhanced the use of artificial insemination in turkeys and chickens.

Advances in embryo-transfer technology are improving the capabilities for increased reproduction by transferring extra progeny from valuable matings to obtain twins in cattle. Induced twinning in beef by either hormone manipulation or embryo transfer is promising. At the Miles City, Montana, ARS research station, 119 percent of a normal calf crop has been produced with induced twinning, while a control herd produced only a 70-percent crop.

Some State integrated reproduction management programs are supported by both State and Federal funds. These include studies in weak-calf syndrome, an extremely costly problem for beef producers in southeastern Idaho, where losses between birth and weaning have exceeded 20 percent. Because of work by the Idaho Agricultural Experiment Station, the Idaho Cooperative Extension Service, and the Idaho Beef Council, the calf loss has been reduced to less than 3 percent.

A pilot beef demonstration in Tennessee involves an integrated program of animal husbandry, forage production, veterinary science, and farm management. An improvement of 9 percent in calf crop weaned was measured in the 5-year demonstration.

The average number of pigs weaned per sow was increased by 3.7 pigs per year in demonstrations in Minnesota. This was achieved by increasing farrowings per year and pigs per litter.

Over 350 State and Federal animal scientists conferred in a symposium at Beltsville, Maryland, and concluded that short-term realistic goals of improving reproduction in food animals could yield an annual economic benefit of $1.5 billion. Perhaps no area of agriculture now holds so many exciting potential breakthroughs for improved food production as animal science. Fifteen major animal industry associations are supporting the development of an integrated reproduction management program concept. In May 1980, a conference on "Animal Agriculture: Research to Meet Human Needs in the 21st Century" in Boyne Falls, Michigan, listed improved reproductive capacity as a high priority area for research.

The key to success in this program is the cooperation of State and Federal researchers, teachers, and extension experts working with the animal industries to identify and solve problems to improve production efficiency.

Near-term priorities--In the short run, research goals should be to--

* Develop improved reproductive performance of food animals.

* Reduce the effects of disease on the productive efficiency of food animals.

* Develop greater efficiencies for converting inedible forages and plant residues to human food via animal feeds derived from range lands, grasslands, and waste materials.

Integrated Pest Management

Background--Despite the use of conventional control technology, pests continue to reduce food, feed, and fiber production efficiency. In the United States, 30 to 50 percent of potential agricultural production is lost to insects, nematodes, plant pathogens, and weeds. It is estimated that these losses exceed $35 billion annually.

The goal of integrated pest management is to develop and implement practical and economically viable protection and production management systems to overcome high energy and fertilization costs, soil erosion problems, and production losses because of pests.

People are becoming increasingly concerned about the influence of conventional pest control on the quality of the environment, on nontarget organisms, and on food safety and wholesomeness. Because of such concerns and economic considerations, integrated pest management (IPM) programs use new control concepts, such as vulnerability in the life cycle of pests, changing development and growth patterns, increasing susceptibility to environmental controls, and pest-specific control agents.

Integrated approaches to production and pest management are based on the selection of agronomic practices, genetically improved varieties, and pest management strategies that are part of a total ecosystem management plan. An integrated approach recognizes the numerous interactions occurring within the agroecosystem, and this calls for an interdisciplinary effort incorporating not only traditional crop production, protection, and economic disciplines but also new technologies, such as systems analysis, microclimatology, and hydrology.

Accomplishments--Significant improvements in agricultural productivity are evident when integrated production and pest management systems are developed and implemented. Examples include the integrated system for cotton production and protection in Texas. This system utilizes short-season cotton varieties that evade early and late season pest development and require less fertilizer and irrigation water. It has reduced production costs for lint 13.8 cents a pound, reduced total energy from 102 gallons of fossil fuel an acre to 69 gallons, and increased producer profits from $12.40 to $102.97 an acre.

The Indiana alfalfa pest management program has a plant growth and pest prediction system continuously updated by weather data and field monitoring to improve the grower decision management process. A statewide economic study focused on one component, alfalfa weevil managment, has demonstrated increased yield and protein values averaging $40 an acre. The potential of the system when addressing the total production-pest complex has been estimated at a value increase of $300 an acre.

Arkansas has conducted a 70,000-acre community wide cotton IPM program over the past 5 years. Insecticide costs alone have been reduced from $75 to $50 an acre.

Massachusetts has conducted an apple program to determine the effectiveness of alternate row spray treatments. Net economic effects and reductions in energy use amounted to savings of $90.02 an acre after quality reduction factors were discounted. Energy savings amounted to 1.85 million Btu's an acre. Corn virus problems in North Central and Southern States have been effectively reduced by management of corn germplasm coupled with other production management techniques. Losses estimated to exceed 30 percent of production capacity have been avoided. Pheromone blends of the corn earworm and tobacco budworm have been developed and used in forecasting peak egg laying. The system of forecasting bollworm populations in Texas in 1980 saved growers approximately $5 million. Effective biological control agents have been discovered for several soil-borne diseases, such as white rot of onions and take-all of wheat. An integrated system has been devised for control of what is commonly known as belly-rot of cucumbers.

A number of insect growth regulators are showing promise in the control of plant parasitic nematodes. Mass propogation of the parasitic wasps has become a routine procedure. New procedures have been developed for other parasitic insects specific to nonbeneficial pests. Exotic parasites have been recently discovered for the corn rootworms and the Colorado potato beetle. Biological control of alligatorweed is now possible because of the importation and integration of certain predators of the alligatorweed into a devised management system. Selective chemical control has also been developed for major weed, insect, and nematode pests.

A biological strategy was developed to control the western pine shoot borer using aerial dispersal of a chemical copy of the insect's own pheromone. The odor of the artificial pheromone confuses the male moths. It prevents them from finding and mating with females, blocking reproduction. Targeted havesting and spraying techniques, developed with the support of the Canada/United States Spruce Budworm Program (CANUSA), were applied by Maine forest landowners and State forestry personnel to reduce the size of the 1980 spruce budworm suppression project by 0.6 million hectares.

The threat of damage to white pine by the introduced pine sawfly, now advancing southward in the Appalachians, appears to have been stemmed by the introduction of parasites from the Lake States that were absent from the sawfly outbreak in the Appalachians.

Timber harvesting guidelines have been developed that can help save lodgepole pine stands from devastation by the mountain pine beetle. In 1980, portions of pine stands were killed by the beetle on 1,675,000 hectares.

New research has identified several strains of Bacillus thuringiensis (a bacterial disease of insects) that are much more active than other strains on the gypsy moth and spruce budworm.

Near-term priorities--Priority production systems for integrated pest management attention are:

* Semiarid irrigated and semiarid dryland agroecosystems in the Western Region, including those for cotton, sugar beets, corn, potatoes, range plants, alfalfa, and small grains;

* Livestock and soybeans in the Southern Region;

* Potatoes and dairy forage in the Northeastern Region; and

* Corn, confined livestock, poultry, and potatoes in the North Central Region.

Food Protection, Distribution, and Exports

Background--The food protection, distribution, and exports program is concerned with the protection of food from damage and losses caused by insects, diseases, molds, fungi, and other spoilage organisms as food is moved from farm to consumer. The major objectives of the program are to (1) reduce food and feed losses, (2) improve food distribution system efficiency, (3) expand exports through protection of product quality and attention to special foreign market needs, and (4) provide research and technical assistance to action and regulatory agencies. Losses occurring in processing and during handling, storage, and transport decrease the yield of usable product, increase costs, and lower the efficiency and productivity of marketing. These losses are estimated at $31 billion per year. Reduction or elimination of postharvest food losses in domestic and export distribution increases available food supplies in the United States and around the world.

Predicted growth in world population and income will increase demands for better diets, shelter, and clothing. These growing demands suggest that U.S. agricultural exports have an even greater potential for future market growth. The United States can increase exports of traditional agricultural commodities and higher valued agricultural products with proper strategies and policies.

The Secretary of Agriculture feels that expansion of agricultural exports and increases in agricultural productivity are two of the most important concerns of the Department. A strong export position has become a matter of great significance to the value of the dollar, to employment, and to the economic strength and welfare of our Nation.

The welfare of U.S. farmers and foreign consumers are closely connected. Today, 25 percent of farm income comes from exports. In 1979, $20.2 billion of the total for exports were from the farm value of raw agricultural exports, and $14.5 billion were for processed products, transportation, trade, and other services. It is estimated that 75 cents of every food and fiber export dollar goes to the nonfarm sector and that each of these dollars generates more than two to the U.S. economy. More than 630,000 of the 1.1 million jobs created by agricultural exports in 1979 were in the nonfarm sector.

The domestic marketing system absorbed approximately 70 percent of the U.S. consumer's food dollar in 1980, at a total cost of $183 billion. During the fifties the food marketing sector was the most productive U.S. industrial segment, whether measured by output/input indices or by value added to products. This productivity began to decline in the sixties. Recent figures show a negative trend in productivity per work-hour in the product-marketing sector at the retail level. A number of factors are responsible, including a lack of innovations, labor inefficiencies, product losses, and excessive regulations. The program in food protection, distribution, and exports is one of several efforts carried on by the State/Federal agricultural science and education system, aimed at improving productivity of the marketing sector. Other areas include food quality and safety, food technology, and safety of nonfood products.

Some of the work to improve the productivity and efficiency of the domestic marketing system also assists in the export of U.S. farm products. However, much of the work in this area is aimed at improving the efficiency of moving food and fiber to consumers in this country who use 75 percent of U.S. agricultural production. Significant strides have been made in the development of methods for reducing damage to corn and other cereal grains, thus improving the marketability of these crops.

Accomplishments--Examples of accomplishments in this area related to the export market include the following:

* State and Federal research laboratories in the United States and abroad have developed packaging and handling methods to prevent spoilage of Texas grapefruit in transit to Europe. As a result, this export market is yielding approximately $12 million per year.

* A fumigation treatment was designed to prevent introduction of the Hessian fly into Japan. Japan had been rejecting U.S. timothy hay, because it contained prohibited materials, including the Hessian fly. Shipments of hay the first month following treatment were valued at $1 million.

* The Florida leather leaf fern was arriving in Europe with damage and poor condition claims on 40 percent of all shipments. Research developed export handling methods that allowed claims to be reduced to 3 percent of shipments and exports increased by 900 percent.

Near-term priorities--In the short run, the emphases should be to--

* Develop integrated pest management techniques to reduce losses in storage, handling, and distribution of grains and horticultural crops.

* Develop innovative systems to reduce food losses from physical and environmental stress.

* Develop information essential to innovative, high-risk solutions to food preservation and protection.

* Develop alternative systems for processing food and fiber to increase energy and water efficiency inputs and decrease pollution and waste.

* Strengthen technical assistance in support of agricultural market development in the Far East.

* Meet quarantine and embargo restrictions of importing countries by developing methods to certify livestock free of bluetongue and leukosis and by maintaining grains free of mycotoxin during export.

* Develop methods for protecting exported germplasm from disease threats in importing countries.

* Maintain the inherent quality and reduce pathological, physiological, and physical losses of agricultural commodities during transport and distribution.

PROCESSING, MARKETING, AND DISTRIBUTION

Postharvest Technologies

Background--Postharvest technologies refer to that portion of the agricultural system between harvest of food and fiber products and their ultimate use by the consumer. It is related to those functions of assembly, preservation, fabrication, packaging, storage, and distribution that are critical to farm returns, consumer costs, and productivity of the total agricultural system.

Maximum productivity of the agricultural system is achieved only when the farm product reaches the consumer. Loss in the postharvest segment represents a loss of all previous input.

The products must be efficiently delivered to the consumer with safety and wholesomeness assured, with quality protected, and in accordance with market demands of time, form, and content in order to provide the farmer with a sufficient and adequate return for investment.

Postharvest technologies significantly affect the consumer because almost 70 percent of consumer cost is incurred in the postharvest sector. In the past decade, inflation and increased cost of fossil fuels have measurably increased consumer food costs. Additional factors that have contributed to this rise are environmental and safety regulations, decreasing labor productivity, and decreasing competition in processing and marketing. It is important, however, to recognize that the regulations were designed to meet consumer needs and, therefore, costs must be absorbed.

Postharvest technology research is broadly distributed among the Federal, State, and private sectors. Agricultural research, with its unique facilities, and multidisciplinary pool of scientists can respond to several needs in postharvest research at the international, national, and regional levels. The land-grant institutions, colleges of 1890, and Tuskegee Institute, working in close partnership, can complement and support the functions of the Federal research agencies as they focus on critical research, teaching, and extension needs within States and regions.

Many private firms, both large and small, are involved in research on postharvest technologies which have the potential to enhance their profits, to provide opportunity to gain a market advantage, and to respond to Government regulations. Many other private firms associated with the postharvest industry engage in little or no formal research activity.

Accomplishments--Several achievements can be identified with postharvest technology research activities:

* An electronic sniffer, which gives early warning of bacterial rot, has been developed and can be installed in potato bins. When fully adopted by growers, this device is expected to reduce the annual loss of 400 to 700 million pounds of potatoes by about 20 percent.

* Scientists in Tennessee have designed and demonstrated an effective air scoop and duct system to provide in-transit cooling for snap beans during transportation and holding.

* Snap beans, one of the major vegetable crops of the United States, have a high potential for total loss just after harvest. Heat generated by the beans during transportation and holding before processing can result in total losses.

* Use of near-infrared technology, currently a part of Federal Grain Inspection Service procedures in wheat grading, was extended to the measurement of forage quality. A prototype self-contained van was equipped at University Park, Pennsylvania, to provide on-the-spot analyses of hay and forage quality at the farm or in the marketplace. Use of this technology will enhance both market and production efficiency and provide the information needed to increase farmer returns by elevating hay and forage to commodity status. It will also make possible electronic marketing of hay.

Other examples of recent accomplishments include development of--

* An ammoniation process for detoxification of mycotoxins in contaminated grains.

* An energy efficient process for producing a protein concentrate for poultry and dehydrated ruminant feed from alfalfa.

* An accelerated, on-the-vine solar drying procedure for raisin production to avoid crop loss because of rain.

* Procedures for low water use and low effluent production during vegetable peeling.

* Fractionation of edible tallow to provide cooking oil and a cocoa butter substitute.

Near-term priorities--For work involving postharvest technologies, shortrun goals are to--

* Provide knowledge of food composition and of chemical and physiological events occurring during postharvest functions to serve as a basis for deregulation.

* Identify barriers limiting efficiency and productivity within the total system and the means to overcome them.

* Develop new methodologies for preservation and control of losses.

* Develop innovative new systems or processes that significantly reduce energy, labor, and water inputs and stimulate competition.

PEOPLE AND COMMUNITIES

Agriculture and Rural Development

Background--Rural development research and education about the viability of agriculture are essential so that local decisionmakers can make informed policy decisions about rural community development. Local rural institutions are key factors in decisionmaking which affects agricultural productivity, general economic development, and the community structure and function. Many of these decisions are crucial if agricultural interests are to be more responsive to the needs and problems in the changing rural community.

Regional needs have been recognized in legislation and appropriations under Title V of the Rural Development Act of 1972. These funds currently support four regional rural development centers. There are 13 regional technical research committees currently focusing on the multi-State aspects of rural, social, and economic trends and conditions.

A primary aim of the Federal rural development policy is to strengthen the ability of State and local governments, along with the private sector, to provide economic opportunities, essential services and facilities, and environmental protection to the rural community. Strengthening agriculture is an essential part of the rural development process. Regional and multi-State subregional research and extension activities help to assure that the various perspectives are all represented in decisionmaking and policy development.

Accomplishments--All four regional development centers participated in regional workshops, conducted by the National Agricultural Lands Study, this past year to provide a local and regional perspective to national decisionmaking in the land use area. Research and extension programs at the four centers, focusing on mental health problems of new and long-time residents of affected areas, have resulted in studies of rural migration in the Midwest at the North-Central Center, analysis of rural population changes in the Northeastern Center, development and testing of a model for transferring computer technology to county officials at the Southern Center, and the human side of energy boomtown problems at the Western Center.

In addition, new housing concepts, directed to more effective use of both natural and fossil fuel energy sources, have been a target of rural housing research at Clemson, S.C. This has developed integrated solar systems which are much lower in cost but with the same benefits as many of the add-on collectors.

Near-term priorities--Agriculture and rural development efforts should--

* Provide more research-based consumer information to assist people in improving their living standards and decisionmaking capabilities.

* Provide low-cost rural waste disposal systems to meet rural community needs.

* Develop increased problem-solving capability in small community governments.

* Improve educational assistance to small-scale farmers.

GENERAL ADMINISTRATION AND PROGRAM SUPPORT

Technical Information Systems

Background--Four main issues involve the effectiveness of agricultural research information dissemination: (1) The proliferation of technical information systems within agriculture, many of which are computerized; (2) advances in information technology, requiring demonstration and dissemination to facilitate and improve the management of agricultural information; (3) the need for rapid analyses of critical agricultural issues; and (4) the need for sharpened awareness among users of the improved timeliness and responsiveness of technical information systems of the National Agricultural Library.

Although many groups have recognized these problems for years, national leadership to organize, coordinate, and integrate these needs has not been adequately funded.

Coordination of Federal information activities to prevent duplication of effort and produce useful products and services has been accomplished through the Federal Library Committee, Federal Council on Science and Technology study groups, and bilaterally with other Federal agencies, such as the Department of Energy, Department of the Interior, and Library of Congress. Some land-grant institutions have cooperative and cost-shared programs.

Many interdepartmental committees are developing solutions to technical information problems. These are only the beginnings of a decentralization trend initiated years ago by the National Agricultural Library (NAL). The land-grant institutions, through their colleges of agriculture and related schools, their computer centers, and their libraries, are becoming part of the total formal information system, which will provide for effective, sustaining, and vital support of agricultural programs.

Accomplishments--In the past year, there have been numerous accomplishments in many information fields. Two landmark agriculture-related energy publications and a new bibliographic file were produced in cooperation with land-grant universities to provide information on the development of alternative sources of energy.

A subfile of aquaculture research projects was established in the Current Research Information System (CRIS). In addition, 84 important foreign language scientific and technical publications on aquaculture were translated by the NAL staff for the Interagency Committee on Marine Sciences and Fisheries.

The Food and Nutrition Information Center reached nearly 1.5 million people in 1980 through its audiovisual lending program. Films, tapes, slides, and other educational aides were used in classrooms and before citizen groups. On-line computer searching and demonstrations in the nutrition area have increased contacts with dieticians and nutritionists to over 40,000 in the past year.

In Extension, 60,000 to 75,000 4-H and other popular publications used by the State services in their educational programs are being included in the AGRICOLA bibliographic data base. State cooperative extension services and USDA's Extension Service and National Agricultural Library are working together on this massive project which will assure that information about State publications is accessible to all States and the Federal Government.

A national electronic mail network to meet Extension Service needs was implemented in March 1981 after a 1-year test, and it is accessible to the entire Federal and State research and education community.

A reporting system on recent program accomplishments of extension throughout the United States is now accessible directly by State and Federal users. The file is on-line through National Telecommunications Systems. The topics covered in the 1980 pilot data base were aquaculture, diet and health, dietary measurement, economic development, energy, farm credit, fish and wildlife management, forest and rangeland management, inflation, and special audiences.

Near-term priorities--National information programs should develop--

* Rapid information access and delivery of relevant, timely, and comprehensive information in forms suited to the needs of individual users and user groups.

* Develop central planning and coordination for accessing, retrieving, and disseminating information.

* Develop a data base to provide adequate information resources for budget preparation, long-range planning, and current management.

Food and Agricultural Expertise Development

Background--Enough college graduates with requisite expertise are basic to advances in agriculture. The professionally trained food and agricultural labor force has been adequate in the past. However, a recent USDA study indicates that serious shortages now exist and are projected to increase through the eighties in many important areas of agriculture. These include agricultural engineering, agricultural economics and business, multidisciplinary crop production, food science, and human nutrition.

The paucity of graduates with advanced degrees necessary for research, education, and extension programs is especially alarming. The number of graduate-degree recipients in several areas of agriculture has not kept pace with employment demand. In fact, graduates in several of these degree specializations are decreasing. Unless reversed, this will severely impede agricultural productivity. The educational development of Ph. D. candidates, which extends for 3 to 5 years, means that funding for competitive graduate fellowships in fiscal year 1983 will not result in an increase of Ph. D. graduates until 1986, at the earliest. Furthermore, time will be needed for these people to become established and productive professionals. This shortage severely reduces the ability of our Federal and State research agencies to maintain their positions at the frontiers of research. The shortages also pose a threat to the maintenance of quality college and university faculties, thereby adversely affecting agricultural education.

Section 1403 of the 1977 Food and Agriculture Act established USDA as the lead agency in the Federal Government for food and agricultural sciences and emphasized teaching as a direct mission of the Department. The act specifically authorized a new program of competitive education grants and fellowships to strengthen training and research programs in the food and agricultural sciences. The predoctoral fellowships authorized in Public Law 95-113 are an important means of increasing food and agricultural expertise in areas of substantial need. These graduate fellowships will be accessible to all institutions on a competitive basis and should attract and develop talent on a broad front.

State governments, however, provide the most financial support for higher education in agriculture, primarily at the undergraduate level. In public universities, faculty compensation is often established by the legislatures or negotiated between the State government and the university. Determining which State universities will offer what kinds of agricultural education is also an important role of State government. Developing agricultural curriculums and granting degrees remain the responsibilities of the individual institution, with accreditation provided by regional and national associations.

Accomplishments--Despite increasing financial burdens and competition from other sectors in 1980 (the most recent statistical reporting year), agricultural institutions awarded 23,000 students bachelor's degrees in agriculture and natural resources, granted 4,000 master's degrees, and awarded 1,000 doctorates. With a larger number of students coming from nonfarm areas, some institutions found it necessary to develop intern programs, particularly in natural resources, to provide fundamental skills required by students without farm or ranch backgrounds.

The State-Federal partnership, expressed through the Bankhead-Jones Act, has enhanced higher education in the food and agricultural sciences. Because of the flexibility with which these funds may be used, universities have been able to direct support to areas of greatest need, such as developing new programs, improving program quality, and attracting and retaining high-quality faculty members.

Because of the opportunity afforded by the Joint Council on Food and Agricultural Sciences through its national and regional higher education committees, interaction and communication have increased among schools offering resident instruction programs in the food and agricultural sciences and USDA.

Cooperators have participated more with USDA's Office of Higher Education in development and evaluation of program priorities and preparation of the 1983 budget than in previous years. University cooperators also have provided continuing input on the manpower assessment program of the food and agricultural sciences. They have assisted USDA with development of the new classification of instructional programs on food and agriculture which will be used by the National Center for Education Statistics in 1982.

Cooperative efforts by the universities and the Office of Higher Education have resulted in an agreement with the Department of Labor to publish an agricultural careers guidebook. USDA and university staff will develop and review the manuscript to assure an accurate portrayal of career opportunities in food and agriculture.

Near-term priorities--The following activities will probably occur in expertise development:

* State universities with agricultural education programs will seek to recruit additional outstanding students for their programs and to enhance the image of careers in agriculture.

* Universities and other educational institutions will be reexamining food and agricultural science curriculums in light of recent changes in the focus and role of American agriculture. Coupled with this will be reevaluation of faculty development programs and a strengthening of educational relationships with agricultural industry.

The Joint Council on Food and Agricultural Sciences has identified the following near-term priorities for further work in the area of food and agricultural expertise development:

* Distribute the summary of the report "Graduates of Higher Education in the Food and Agricultural Sciences: An Analysis of Supply/Demand Relationships--Volume II, Home Economics" to user groups across the country. This summary gives the most significant findings in a brief easy-to-read style.

* Develop a data base that provides current information on a continuing basis on the supply of, and demand for, graduates in the food and agricultural sciences; student credit hours produced by disciplines, student quality, and backgrounds; budgeted faculty positions in resident instruction; faculty vacancies by discipline and rank; staffing by graduate assistants; and financial information, such as salaries, operations, and capital. Develop a Food and Agricultural Education Information System (FAEIS) to gather, analyze, and publish essential statistics.

* Through USDA's Office of Higher Education, continue the food and agricultural manpower assessment project by publishing volume III: "Sex, Race, and Ethnic Characteristics of Graduates/Students and of Workers in Food and Agricultural Sciences." This publication will assist the food and agricultural science and education community in recruiting personnel from the pool of qualified minorities and women.

* Through USDA's Office of Higher Education and science and education agencies, work with institutions of higher education to prepare and disseminate agricultural career information to the public and to identify potential students for agricultural disciplines.

* The Joint Council and appropriate institutions should encourage and support funding under the authority of Title XIV of the Food and Agriculture Act, including funding for fellowships for graduate education, internships, educational facilities and equipment, and curriculum studies.

* The Joint Council, USDA's Office of Higher Education and science and education agencies, and universities should work together to develop national educational policy concerning the food and agricultural sciences.

Philosophy

In 1981, the Joint Council has given considerable attention to how it could best carry out its mandate to improve planning and coordination in a system characterized by diversity, decentralized decisionmaking, and numerous existing planning and coordination activities. The philosophy that evolved can be described by the following principles:

* Participation in planning and coordination activities must be voluntary.

* The process must involve people with responsibility for carrying out research, extension, and teaching programs at State or regional levels.

* The process must be from the bottom up (from scientists and educators), with the Joint Council facilitating the process, putting the various components into a national context, and providing an overall focus.

* Existing committees and groups should be used to the extent possible.

Structure

The formal structure for planning and coordination that evolved from this philosophy consists of--

* The Joint Council.

* Four regional councils to concentrate on issues that cut across research, extension, and teaching, and to provide a regional perspective to the Joint Council.

* Three functional committees at the national level for research, extension, and teaching to develop national plans, coordinate activities, and advise the Joint Council on policy issues affecting the functional areas.

Regional councils and national committees were encouraged to use existing committees and groups to ensure that local and State points of view were adequately represented and to form new groups as necessary. Regional research committees, which have been functioning for several years, have been continued, and regional extension and teaching committees have been organized in some regions. The Joint Council receives information from the regional councils and national plans for program areas from the national committees.

While developing its committee structure, the Council has carried out a number of planning and coordination activities on an ad hoc basis. And it has endorsed the continuation of activities started before the Council was formed.

THE JOINT COUNCIL AGENDA

This year, the Council appointed an Agenda Committee to identify high priority topics and develop the Joint Council planning and coordination. The Council chose water, agricultural productivity, and energy as its top three priority issues for emphasis in 1981 and four additional areas that are important for science and education in the coming years: technology transfer; human resources; budgets for research, extension, and teaching; and postharvest technology, marketing, and exports.

AGENDA PRIORITIES AND ACCOMPLISHMENTS

Following is a summary of 1981 accomplishments of the Joint Council, its four regional councils, and three national committees.

Water

Issue--Diminishing water supplies for agriculture, degradation of water quality, and growth in the number of agencies and organizations with water programs have increased concerns about the adequacy and coordination of water research and education programs.

Objectives--To address the issue of coordinated water resources management, to advise the Secretary of Agriculture and other administrators about research and education programs related to water and agriculture, and to foster improved planning and coordination among research, extension, and teaching on water and agriculture.

Progress--The Council held a symposium on water at its April 1981 meeting. This provided members with an overview of national and regional problems related to water in agriculture and brought together a number of administrators and staff to exchange information.

The Council has appointed a standing Committee on Water which will address: (1) The adequacy of data on research, extension, and teaching programs related to water and agriculture; and (2) the adequacy of impact-evaluation studies on water.

The Joint Council arranged for Garrey E. Carruthers, Assistant Secretary for Land and Water Resources, Department of the Interior, to address the Council at its October 1981 meeting. He encouraged the Council to examine coordination of water resources research in the Federal Government.

Agricultural Productivity

Issue--The Agenda Committee's May 1980 report stated:

> "The U.S. now faces new challenges to improve agricultural productivity in the 21st century. There is increasing realization that the Nation's inflation problems could be dealt with significantly through increases in productivity; productivity improvements are required for labor and land inputs and now must include more efficient use of energy and water; and low-cost domestic fuel and readily available water are no longer available to substitute for land and labor. In addition, there are environmental constraints that were not present 15 years ago. Given these new dimensions, the need for scientific information and its dissemination are greater than ever."

Objectives--To assist the science and education system in focusing its efforts on the major barriers to increased productivity and to advise the Secretary and other administrators on how to contribute to increasing productivity.

Progress--At the February 1981 meeting, held jointly with the Users Advisory Board, experts presented overviews on agricultural productivity. (See the section entitled "Joint Council/Users Advisory Board Interaction in Priority Areas.")

The Joint Council has recommended to the Secretary of Agriculture that a comprehensive assessment of the opportunities for increasing productivity in the various sectors of food and agriculture be undertaken. The Joint Council recommended specifically that the Cabinet-level Council on Food and Agriculture examine this issue and consider commissioning a national assessment.

Energy

Issue--One of the most critical issues facing agriculture in the eighties is the production and conservation of energy.

Objectives--To improve planning and coordination of energy programs related to agriculture, to advise the Secretary of Agriculture about programs relative to energy in agriculture, and to determine agriculture's energy needs over the next 20 years.

Progress--The Joint Council selected energy as one of its top three areas of emphasis during 1981, and it created an Ad Hoc Committee on Energy.

The Joint Council's Committee on Energy completed--

* A review of current programs within and outside USDA related to energy and agriculture.

* A conference for representatives of Federal agencies with programs related to energy in agriculture.

* A report to the Secretary of Agriculture identifying major energy issues facing U.S. agriculture and USDA. The committee recommended that (a) the Secretary make a clear statement regarding the interest of the USDA in energy, (b) the Secretary seek White House approval to make direct budget requests for energy programs instead of obtaining pass-through funds through the Department of Energy, (c) a Departmental energy coordinating committee be established, (d) USDA reexamine technologies currently in place with the goal of reducing dependence on petrochemical energy, (e) the Secretary have direct input into policy issues that may be based in another Department as a primary focal point, such as the Department of the Interior's Office of Water Research and Technology, and (f) agricultural engineering expertise be developed for future energy programs.

OTHER PRIORITIES AND ACCOMPLISHMENTS

Human Expertise Development in the Food and Agricultural Sciences

Issue--If the United States is to continue as the lead nation in confronting problems associated with increasing population and decreasing agricultural and natural resources, it needs individuals with higher education in the food and agricultural sciences. Volume I of a recent USDA study, "Graduates of Higher Education in Food and Agricultural Sciences: An Analysis of Supply/Demand Relationships," indicates that the number of future graduates in agriculture will fall far short of projected needs.

Objectives--To alert the food and agricultural science and education system to human resources supply and demand relationships, to foster planning activities to obtain sufficient expertise to meet future needs of agriculture, and to reaffirm USDA's role in higher education.

Progress--The Joint Council has followed the development of USDA's manpower studies closely. An issue paper was prepared for Secretary John Block on this subject. And the Joint Council's National Higher Education Committee will continue to look into the various aspects of this issue.

Program Structure and Management Information Systems

Issue--The Joint Council recognizes the importance of having a common national program structure to facilitate joint planning, management, and implementation of food and agriculture research and education programs. Many different planning and reporting systems now are used by the various partners represented on the Joint Council.

Existing program structures and systems generally meet the needs of individual performers but are less responsive to the needs of organizations, such as the Joint Council, who wish to "look across all performers" in considering policy, budget, and other implications for the total food and agricultural science system.

Objective--To adopt an encompassing program structure or program information classification system that would permit summarizing information and conducting analyses to foster improved communication within the food and agricultural science system and between the system and the general public, legislative and executive bodies, and other groups.

Progress--The Program Structure Study Group's report to the Joint Council identified (1) program categories that provide a set taxonomy for grouping performer activities, (2) thrust areas that provide a flexible taxonomy of problem areas that may be of timely interest, (3) data characteristics, and (4) integrated information system chracteristics.

The Council adopted the following categories for a systemwide common program structure:

I. NATURAL RESOURCES (Land, Water and Air, Forests, Range, and Wildlife)

II. PRODUCTION AND PROTECTION (Plant Production, Plant Protection, Animal Production, and Animal Protection Systems)

III. PROCESSING, MARKETING, AND DISTRIBUTION (Food Systems, Nonfood Systems, and Food Quality and Safety)

IV. PEOPLE AND COMMUNITIES (Human Nutrition and Consumer Programs, Individual and Family Development, Community and Rural Development, and Youth Development)

V. AGRICULTURAL POLICY (Agriculture and Food Policy, and Demand and Supply)

VI. GENERAL ADMINISTRATION AND PROGRAM SUPPORT (Technical Information Systems, Administrative and Financial Support, Facilities Support, and Expertise Development)

Performers are examining implications of this program structure for integration with their respective planning and reporting systems. The Operating Guidelines for Science and Education identify mission objectives for USDA's science and education agencies which correspond with this common program structure.

ADVISING THE SECRETARY OF AGRICULTURE

In addition to congressionally mandated reports, in 1981 the Council initiated two methods to increase interaction with the Secretary and his top staff.

Issue Papers

So that Secretary Block could be apprised of priority issues facing the food and agriculture science and education system as he began his duties, the Council provided 10 issue papers highlighting critical issues that require action by the Secretary of Agriculture and 11 information papers giving background information for decisionmaking.

Issue papers covered these areas: (1) Strengthening the USDA/State partnerships; (2) relationship of the USDA with the Executive Office of the President; (3) science and education coordination in the USDA; (4) role of the land-grant universities of 1890 and Tuskegee Institute; (5) revision of Title XIV; (6) facility needs for the food and agricultural system; (7) human expertise development in USDA; (8) human nutrition in USDA; (9) renewable resources extension program; and (10) research and education for rural and community development.

Information papers covered these topics: (1) Proposed science and education initiatives for 1981-86; (2) Federal budgets for agricultural research, extension, and education; (3) USDA support for fundamental research; (4) formula versus earmarked funds/competitive grants; (5) research and education support of the Soil and Water Resources Conservation Act (RCA) and Forest and Rangeland Renewable Resources Planning Act (RPA); (6) USDA energy program; (7) integrated pest management; (8) information resource management; (9) role of USDA regarding home economics and the family; (10) role of USDA regarding 4-H youth development; and (11) small-scale family farms.

Responses to Questions Asked by Secretary Block

In July, the Secretary submitted questions to the Council covering a variety of science and education issues and reflecting his special interests and concerns. Responses, drafted by Council members, formed the basis for discussions with the Secretary's top staff at the July meeting.

Questions and responses covered several issues including (1) planning, coordination, and evaluation of agricultural science and education programs; (2) the Council's advisory relationship with the Secretary; (3) research, extension, and teaching programs for small family farms; (4) technology transfer; (5) Extension Service staffing; (6) agricultural marketing; (7) manpower for agriculture; and (8) the Joint Council's role in responding to the Department's goals.

WESTERN REGIONAL COUNCIL

Regional Planning System

These committees for research, extension, and teaching operate under the Western Regional Council:

The Western Agricultural Research Committee submitted its report of research priorities for food, forestry, and agricultural sciences through 1985. In descending order, priorities are as follows:

(1) Improve the use and conservation of water;

(2) Develop new techniques for improving forest and range productivity;

(3) Improve management methods to increase reproductive efficiency of livestock;

(4) Develop integrated systematic control for plant-animal pests;

(5) Improve safety and nutritional quality of processed foods;

(6) Develop ways to improve the quality of rural living; and

(7) Improve commodity policies and programs.

The plan is being updated to cover priorities through 1986 and will be submitted to the Joint Council in fall 1982.

The Western Higher Education Committee was organized and became quite active during 1981. As a result of committee action, the Western Regional Council (WRC) asked the Users Advisory Board to consider the great need for the development of professional manpower resources through education and training in order to provide extension and research expertise in the food and agricultural sciences. Also, the WRC wrote to the Secretary of Agriculture and the Director of Science and Education, expressing strong support for the restoration of funding for the Bankhead-Jones Act in the fiscal year 1982 budget for programs in the food and agricultural sciences, as defined in Public Law 95-113.

The Western Extension Committee is composed of members of the Western Association of Extension Directors. Because of resignations and retirements, it has been difficult to maintain representation on the Western Regional Council.

WRC Priorities

The Western Regional Council spent considerable time during 1981 considering its role in relation to the Joint Council and the kind of activities that it would undertake in support of the food and agricultural sciences in the Western Region. There was general agreement that the WRC should focus on subjects that would be particularly pertinent to the West in the future and should bring these to the attention of the Joint Council. Among the issues explored were water, energy, rangeland, renewable resources, productivity, and animal diseases.

WRC reached consensus on rangeland as an issue vital to the West as well as the future of the Nation. This issue relates to a number of issues identified as high priority by the Joint Council--water, energy, productivity, and technology transfer. It will require research, extension, and higher education. The chairs of WRC's functional committees will serve as a coordinating committee to develop an inventory of activities in rangeland, assess past efforts, and determine future needs.

NORTHEAST REGIONAL COUNCIL

The Northeast Regional Council (NERC) developed the following objectives for 1981:

(1) Implement the three regional functional committees: Higher education, cooperative extension, and research.

(2) Improve understanding of the Joint Council.

(3) Identify broad Northeast regional issues which cut across higher education, cooperative extension, and research.

Regional Planning System

Accomplishments to date have been to put the new regional planning system in place and to develop a substantive core of support for the Joint Council-Regional Council concept within the Northeast.

In 1981, NERC established three regional functional committees in higher education, cooperative extension, and research. The Northeast Regional Research Committee is helping the National Agricultural Research Committee in planning efforts. The Higher Education Committee held its organizational meeting in September. The Cooperative Extension Committee will conduct its initial meeting early in 1982.

NERC Priorities

Energy--The Northeast Regional Council has selected energy as its first major focus for improving planning and coordination efforts, and will likely move forward in this area through a multidisciplinary task force. Reports presented to the NERC at its January 1981 meeting reviewed agricultural and forest energy concerns and related problems in the Northeast. At its September meeting, NERC discussed an overview of the farm energy utilization research and development program of a large cooperative serving the production needs of Northeastern farmers. This helped broaden the Council's perspective beyond the academe-USDA purview.

Animal Health--NERC is concerned about the limited regional and national resources devoted to the study of diseases of food-producing animals in light of the importance of this issue. It will continue to pursue this topic.

NORTH CENTRAL REGIONAL COUNCIL

Activities

Efforts of the North Central Regional Council centered around the following activities in 1981:

(1) Establishing the Council's membership and committee structure and increasing communication with the Joint Council and its national committees for higher education, research, and extension.

(2) Concern for the future adequacy of human resources in agricultural extension, teaching, and research.

(3) Examining the status of computerization in the North Central Region--particularly the activities of the North Central Computer Institute in Wisconsin--a new organization to enhance the computer-based information services of land-grant universities in the North Central Region.

Regional Planning System

The North Central Region Research Committee will be formally organized under the North Central Regional Council.

SOUTHERN REGIONAL COUNCIL

The Southern Regional Council was appointed and organized in 1980. However, it did not meet in 1981.

NATIONAL COMMITTEES

National Agricultural Research Committee

Selected 1981 accomplishments of the National Agricultural Research Committee (NARC) include the following:

(1) Development of a NARC charter to guide the functioning of the committee.

(2) Publication of its regional/national projections report: "1981-86 Cycle for Projecting and Analyzing Research Program Adjustments with Historical Trends and Comparisons."

(3) Overseeing a pilot technology assessment of corn, in cooperation with the Joint Council's Committee on Technology Assessment at the University of Minnesota.

(4) Appointment of two subcommittees--one to draft a report describing features of basic agricultural research; and another to design a brochure describing the regional/national agricultural research planning process.

National Extension Committee

In 1981, areas of focus for the National Extension Committee (NEC) included energy, research-extension linkages, and technology transfer:

Energy--NEC has recognized the continuing need for the collection, evaluation, and dissemination of reliable information on the efficient use of energy in agriculture and rural areas. It has recommended to the Joint Council that it support the development of an energy extension program within USDA and that the Council advocate that funding be provided directly to the USDA for such programs.

Research-Extension Linkages--NEC is examining the research base and its linkage to extension programs. It has recognized that the issue has two aspects: (1) Is there sufficient research planned or underway regarding critical local problems, which extension is facing pressure to address? And (2) do all current extension programs have adequate working linkages to research which might be relevant and applicable to problems extension is seeking to address? NEC has urged the Secretary of Agriculture and research and extension national administrators to recognize the importance of this issue.

Technology Transfer--NEC recognizes the importance of the technology transfer issue to the accomplishment of extension's mission. NEC also sees a strong necessity to expand the use of automated information systems with agricultural producers and clientele. NEC believes that current computer technology efforts within the USDA and with other agencies need to be better coordinated and that the Secretary of Agriculture, in concert with the Administrator, Extension Service, should establish a policy concerning the integrated usage of computer technology in national extension programs.

National Higher Education Committee

1981 priorities of the National Higher Education Committee (NHEC) included the following:

Higher Education Information System--NHEC adopted a resolution requesting that the Joint Council sponsor development of a national information system for higher education in the food and agricultural sciences. A work group was appointed to conduct initial planning for the system. This system is expected to provide data regarding food and agricultural sciences expertise development using the common program structure adopted by the Joint Council. The USDA Office of Higher Education has subsequently initiated the development of the Food and Agricultural Education Information System (FAEIS).

Assessment of Curriculums--A work group was appointed to prepare objectives and procedural guidelines for conducting a National Assessment of Curriculum in the Food and Agricultural Sciences, that is, a major investigation of current curriculums being used in higher education institutions, identifying needed modifications for the future.

Permanent Assistant Director for Higher Education--NHEC recommended to the Joint Council that the assistant director for higher education be established in the USDA Office of Higher Education as a permanent position to insure long-range coordination of higher education activities.

Joint Council/Users Advisory Board Interaction in Priority Areas

Title XIV of the 1977 Food and Agriculture Act established the National Agricultural Research and Extension Users Advisory Board (UAB) and gave it the general responsibility of preparing independent advisory opinions on the food and agricultural sciences. To further the exchange of information and opinions between the providers of agricultural research and the users, two UAB members are elected to serve on the Joint Council.

Title XIV legislation requires that the Joint Council and Users Advisory Board hold at least one joint meeting a year.

At the February 1981 joint meeting, the two groups held joint discussions and heard presentations on agricultural productivity and natural resources, high priority concerns of both the Council and the Board.

Speakers discussed the relationship of today's efforts to tomorrow's demands. They said that productivity rates are slowing and increases in resource demands are continuing. The critical resources for food production include manpower, climate, land, water, energy, and mechanization. All of these are, or will be, in short demand. In addition, planning is needed for a shift from a resource-based agriculture to one more biologically and scientifically based. The natural resources base is currently undergoing an intensive assessment and long-range planning process to assure that the soil and water resources and forest and range products can be managed to meet the public demands and sustain the resource base.

Joint Council/Users Advisory Board Relationship

The combined meeting closed with a discussion of Joint Council and Users Advisory Board relationships. These comments were made during this session:

* Dissatisfaction with the current pattern of annual discussions with little interim interaction.

* Some Council members' concern that UAB recommendations might differ if the UAB had a better technical information base. Board members said that they see their responsibility as providing opinions from the perspective of users, not as technical experts. Even when these opinions are technically inaccurate, research and extension providers gain an important insight into misconceptions most likely to be held by the broader community of users, according to Board members.

* The UAB indicated it did feel the need for improved technical and oversight information.

* The Council expressed a desire to provide the UAB with technical information it needs. Numerous alternative means of doing so were discussed including joint study committees.

* The discussion closed with a commitment by the UAB to inform the Council regularly of its priority issues of inquiry and a commitment by the Council to provide the Board with technical information.

In addition to the combined JC/UAB meeting in 1981, the Users Advisory Board chairman met with the Joint Council Executive Committee to discuss issues of mutual concern.

Appendix: Membership List of the Joint Council on Food and Agricultural Sciences

*ANDERSON, James H. (Cochairman)
Dean, College of Agriculture and Natural Resources
Michigan State University
East Lansing, Michigan 48824

*BERTRAND, Anson R. (Cochairman)
Director, Science and Education
U.S. Department of Agriculture
Room 217-W, Administration Bldg.
Washington, D.C. 20250

BALDWIN, A. Richard
Vice President and Executive Director of Research
Cargill, Inc.
P.O. Box 9300
Minneapolis, Minnesota 55440

BOGORAD, Lawrence
Professor, Biological Laboratories
Harvard University
16 Divinity Avenue
Cambridge, Massachusetts 02138

*BUCKMAN, Robert E.
Deputy Chief for Research
Forest Service
U.S. Department of Agriculture
Room 3007, South Building
Washington, D.C. 20250

FARLEY, Richard A.
Acting Administrator
National Agricultural Library
U.S. Department of Agriculture
Room 109, NAL Bldg.
Beltsville, Maryland 20705

FLOATE, Raymond T.
Box 325, Route 2
Hartford, Michigan 49057

*GERWIG, John L.
Dean of Extension
Cook College
Rutgers--The State University of New Jersey
New Brunswick, New Jersey 08903

GREENWOOD, Mary Nell
Administrator
Extension Service
U.S. Department of Agriculture
Room 340-A, Administration Bldg.
Washington, D.C. 20250

GOECKER, Allan D.
Assistant Director for Higher Education
Science and Education Program Staff
U.S. Department of Agriculture
Room 426-A, Administration Bldg.
Washington, D.C. 20250

HILDRETH, R. J.
Managing Director
Farm Foundation
1211 W. 22nd Street
Oak Brook, Illinois 60521

JOHNS, Dawson M.
942 N. Main Street
P.O. Box 127
Homer, Louisiana 71040

JORDAN, John P.
Director, Agricultural Experiment Station
Colorado State University
Fort Collins, Colorado 80523

KINNEY, Terry B., Jr.
Acting Administrator
Agricultural Research Service
U.S. Department of Agriculture
Room 302-A, Administration Bldg.
Washington, D.C. 20250

*LEE, John
Acting Administrator
Economic Research Service
U.S. Department of Agriculture
Room 448, GHI Bldg.
500 12th Street, S.W.
Washington, D.C. 20250

* Member of the Executive Committee.

U.S. GOVERNMENT PRINTING OFFICE: 1982-360-932:SEA-1042

OACE, Susan M.
Associate Professor of Nutrition
Department of Nutritional Science
University of California
Berkeley, California 94720

PRAGER, Denis
Senior Policy Analyst
Office of Science & Technology Policy
Executive Office of the President
Washington, D.C. 20500

*ROBINSON, Harold F.
Chancellor, Western Carolina University
Cullowhee, North Carolina 28723

SKOK, Richard A.
Dean, College of Forestry
University of Minnesota
110 Green Hall
1530 N. Cleveland Ave.
St. Paul, Minnesota 55108

SLEDGE, George W.
Associate Dean, College of
Agricultural and Life Sciences
University of Wisconsin
Madison, Wisconsin 53706

SMALLWOOD, Charles M.
Dean, School of Agriculture and
Home Economics
California State University
Fresno, California 93740

THOMAS, Alvin I.
President
Prairie View A&M University
Prairie View, Texas 77445

THOMAS, W. I.
Acting Administrator
Cooperative State Research Service
U.S. Department of Agriculture
Room 322-A, Administration Bldg.
Washington, D.C. 20250

Executive Director of the Joint Council

STOVALL, John G.
Science and Education Program Staff
U.S. Department of Agriculture
Room 304-A, Administration Bldg.
Washington, D.C. 20250

Executive Secretary for the Joint Council

SCHRAM, Susan G.
Science and Education Program Staff
U.S. Department of Agriculture
Room 351-A, Administration Bldg.
Washington, D.C. 20250

*Member of the Executive Committee.

U.S. DEPARTMENT OF AGRICULTURE
WASHINGTON, D.C. 20250

OFFICIAL BUSINESS
Penalty for Private Use, $300

POSTAGE & FEES PAID
United States Department of Agriculture
AGR 101

THIRD CLASS BULK RATE